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UNITED STATES PATENT APPLICATION

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for a

CABLE CONNECTION DEVICE AND METHOD

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Cable Connection Device And Method

Background Of The Invention

The present invention relates to a device with the capability of allowing electronic circuits to be easily fitted to pre-existing electrical cables. The device utilises a method of facilitating good electrical and mechanical contact with electrical cables, without any need for alteration of the electrical cables, and for retention of the cables in position. In particular, the present invention relates to such a device which is quickly and easily snap-fitted to the cable(s).

10 Description Of The Prior Art

In the field of automotive power electronics, devices for monitoring and control of electrical characteristics, such as voltage levels, of the power circuitry are presently provided pre-attached to the electronic cabling to be used in the automotive application.

15 For example, charging leads for charging or obtaining charge from a power source are available with integrally formed electronic circuitry having the function of preventing surges in electronic variables, such as voltage fluctuations, which can occur when current passes from a voltage source. This can occur in situations such as using charging cables to charge the battery of a motor vehicle.

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Certain electronic variable monitoring, such as current, voltage and power signals and levels, is presently available as a transportable diagnostic device for pre-existing cabling. These devices usually comprise a sharp metallic point which when pushed through cable insulation provides electrical contact with the conducting core of the electrical cable. These devices offer no permanent electronic monitoring, control or protection capabilities, but rather serve as a 'trouble-shooting' diagnostic.

This identifies a need for a device that may be used to easily attach an arbitrary electronic circuit to a wide range of pre-existing cables, either permanently or temporarily.

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Summary Of The Invention

The present invention seeks to provide a casing for an electronic circuit such that the casing assists in making stable electrical contact between the electronic circuitry integrally formed within the casing and the electrical cables to be monitored or controlled.

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The present invention seeks to provide a casing for housing an electronic circuit, said casing characterised in that it includes at least one cable connection means to secure said casing to a cable. Preferably said cable connection means is formed by a hinged wing adapted to close substantially about said cable. Also preferably said cable connection means includes at least one conductive spike adapted to pierce the insulative sheath of said cable. In use, when said cable is positioned within said cable connection means and said hinged wing is closed therearound, said insulative sheath of said cable is pierced by said conductive spike(s) to facilitate an electrical connection between said cable and said electronic circuit.

15 In one broad form the present invention provides a device to facilitate electrical connections to a cable, wire or the like, said device including:

 a housing having a hinged or otherwise movable covering; and,

 at least one conductive spike provided substantially within said housing;

 such that, in use, a portion of said cable or wire is positioned proximal to said spike(s)

20 and said movable covering is closed to substantially surround said portion of said cable or wire, whereby said spike(s) is/are retained in electrical connection with said cable or wire.

Preferably, said cable, wire or the like includes an insulative sheath therearound whereby, in use, said spike(s), pierce(s) said insulative sheath and contacts said wire or cable.

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Also preferably, said housing has retaining means associated therewith to permanently or removably retain said housing in a closed position about said cable or wire.

In this preferred form, said retaining means includes locking pins and locking pin receptors.

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Preferably, said housing further includes support means to urge said cable or wire in a direction towards said spike(s).

In this form, preferably, said support means includes biased projecting members.

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Perhaps most preferably, said projecting members are integrally formed with said casing and are adapted to project in a substantially transverse direction to the axial direction of said cable.

10 In a preferred form, said projecting members have shaped ends adapted to at least partially surround said cable or wire.

Also preferably, the device is embodied, wherein two or more sets of projecting members are provided for retention of cables of varying diameter in said housing, each set of projecting
15 members including at least one member of different length.

In a most preferred form, said movable member is embodied in the form of a hinged wing.

Most preferably, two or more housings are provided, each for connection of a respective wire
20 or cable.

In a preferred embodiment, said device further includes an electrical circuit to be connected to said cable(s).

25 In a most preferred form, said housing(s) are formed of insulative, such as plastics, material.

In a further broad form, the present invention provides a device to facilitate electrical connection to a plurality of cables, wires or the like, said device including:

- a housing having a plurality of hinged or otherwise movable coverings;
- 30 each having at least one conductive spike provided substantially within said housing;
- such that, in use, a portion of one cable or wire is positioned proximal to a spike and

each movable covering is closed to substantially surround its respective portion of cable or wire, whereby each spike is retained in electrical connection with its respective cable or wire.

5 In this preferred form, the device preferably further includes an electrical circuit for connection to each of said plurality of cables.

In yet still a further broad form, the present invention provides a device to facilitate electrical connection to a pair of cables, wires or the like, said device including:

10 a housing having a pair of hinged wing members, each adapted to be closed about a respective cable or wire in a permanent or removable manner; and,

at least one conductive spike associated in each housing;

such that, in use, a portion of a cable or wire is positioned proximal to said spike(s) associated with a respective housing; and each hinged wing member is closed to surround said
15 respective portion of cable, whereby said spike(s) is/are retained in electrical connection with said cable or wire.

In this form, preferably, said housing further includes an electrical circuit for connection to each of said cables or wires.

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Brief Description Of The Drawings

The present invention will become more fully understood from the following detailed description of a preferred but non-limiting embodiment thereof, described in connection with the accompanying drawings, wherein:

25 Fig. 1 illustrates various views of a preferred embodiment of the present invention, and shows the lower half of the device;

Fig. 2 illustrates various views of a preferred embodiment of the present invention, and shows the upper half of the device;

Fig. 3 illustrates a preferred embodiment of the present invention, and shows an
30 sectional view of the assembled device; and,

Fig. 4 illustrates end views of the assembled device.

Detailed Description Of A Preferred Embodiment

Throughout the drawings, like numerals will be used to identify similar features, except where expressly otherwise indicated.

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A preferred embodiment of the present invention is shown in Figs. 1, 2 and 3. In this embodiment the present invention provides a moulded plastic casing 1 which houses a printed circuit board 9 together with appropriate electronic components. For example, the casing 1 may house the voltage monitoring and control electronic circuit disclosed in the Applicant's Australian Patent No. 620091.

Fig. 1 shows the lower half of the casing 1. Fig. 1(a) showing an elevational view, Fig. 1(b) showing a plan view, Fig. 1(c) showing a bottom view, and, Fig. 1(d) showing an end elevational view of a 'wing' of the device. The upper half 6 of the casing 1 is presented in Fig. 2, with Fig. 2(a) showing a side elevational view, Fig. 2(b) showing a top view, Fig. 2(c) showing a plan view and Fig. 2(d) showing a front elevational view. Connecting these halves together forms the device, shown in sectional view in Fig. 3, and as illustrated in Fig. 4, Fig. 4(a) showing a side elevational view with the 'wings' open and Fig. 4(b) showing a side elevational view with the 'wings' closed.

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Each 'wing' 11 of the casing pivots along the hinge means 12 such that when the wing 11 is closed, as per the position illustrated in Fig. 3, an electrical cable or wire may be permanently or removably clamped therein.

25 Locking pins 4 in conjunction with the locking pin receptors 7 embody the retaining means to fix the flexible wings 11 into place so as the device remains clamped to an electrical cable. Underneath the locking pin receptors are provided a support means, embodied as tapered webs which provide mechanical support for the locking pin receptors and also help guide the electronic cable into a central position over the electronic connector spikes 10, ensuring they
30 make and maintain good contact with the conductive core of the electrical cabling when the wings 11 are closed.

The protrusions or biased projection means 2 and 3 embody the 'support means' for mechanical clamping of the device to electrical cable. These protrusions extend from the surface of the casing and physically push the cable onto the spiked electrical contacts 10 of the electronic circuit board 9. The protrusions 2 are typically for use in clamping cables of less than, say 12 mm, outer diameter, whilst the protrusions 3 aid in clamping cables with an outer diameter of greater than, say 4 mm. For small outer diameter cables, grommets may be supplied into the arches 5 and help hold the cables in position.

10 The protrusions 3, of which four are present in this embodiment, are preferably manufactured to bend at their base so as to provide a clamping force due to relaxing of the distorted moulded plastic. Bending of the protrusions 3 also allows the protrusions 2 to clamp larger outer diameter cables.

15 An orifice 8 in the upper half of the device allows viewing of an LED located on the electronic circuit board that may typically indicates the status of certain electronic variables. Obviously, the casing may be varied to contain other circuits and show other displays.

It will be understood that, whilst a very specific embodiment has been described, numerous other variations and modifications of the invention will become apparent to persons skilled in the art. All such variations and modifications should be considered to fall within the scope of the invention as broadly hereinbefore described and as hereinafter claimed.

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